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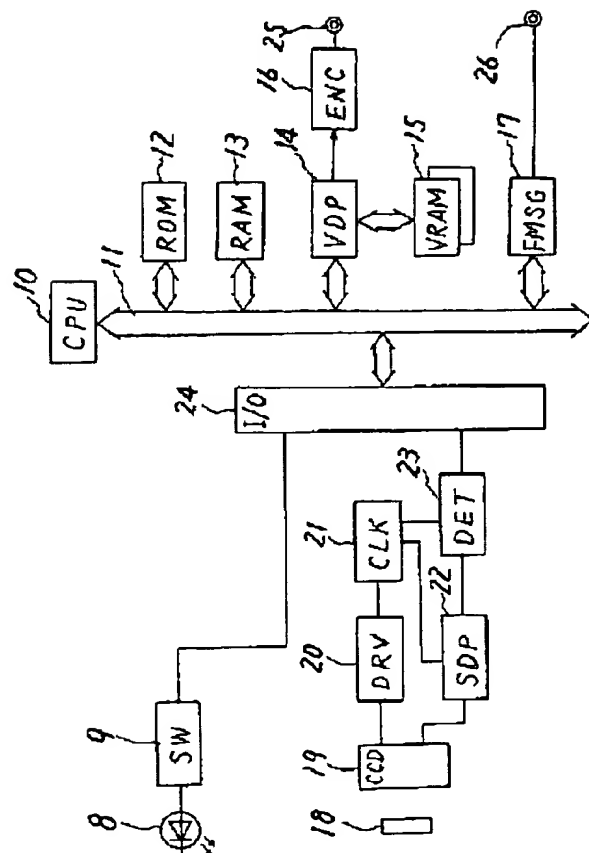
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TITLE : OPERATOR POSITION DETECTOR  
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THE POSITION DETECTOR



ABSTRACT : PROBLEM TO BE SOLVED: To detect the movement of an operator with a simple configuration in regard of a position detector which detects the position of the operator and a display controller which uses the position detector.

SOLUTION: A display controller detects the position of an operator and controls the display contents according to the detected position of the operator. Then an infrared reflection member or an infrared emitting means is put on the operator. A two-dimensional image pickup means 19 is added to photograph the infrared rays emitted from the member put on the operator, together with a position detection means 23 which detects the position of the infrared reflection means out of the output of the means 19, and the control means 10 to 17 which control the display contents according to the position that is detected by the means 23.

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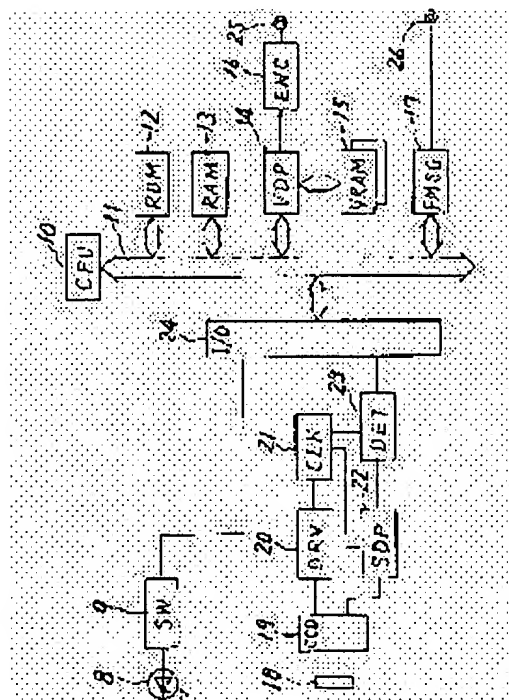
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## (54) OPERATOR POSITION DETECTOR AND DISPLAY CONTROLLER USING THE POSITION DETECTOR

(57)Abstract:

PROBLEM TO BE SOLVED: To detect the movement of an operator with a simple configuration in regard of a position detector which detects the position of the operator and a display controller which uses the position detector.

SOLUTION: A display controller detects the position of an operator and controls the display contents according to the detected position of the operator. Then an infrared reflection member or an infrared emitting means is put on the operator. A two-dimensional image pickup means 19 is added to photograph the infrared rays emitted from the member put on the operator, together with a position detection means 23 which detects the position of the infrared reflection means out of the output of the means 19, and the control means 10 to 17 which control the display contents according to the



position that is detected by the means 23.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

[0001]

[The technical field to which invention belongs] this invention relates to the position detection equipment of the operator for detecting especially the movement of an operator's body, and the display controller using this about the position detection equipment of the operator for detecting an operator's position, and the display controller using this.

[0002] In recent years, TV-game equipment is used widely. In such TV-game equipment, in order to play a TV game, an operator (player) needs to do a certain input.

[0003]

[Description of the Prior Art] Conventionally, the controller by which the cross-joint cursor key and the command switch were formed was used for TV-game equipment. And the player operated the controller with both hands, and was moving and playing the character of a screen etc.

[0004] The method by this controller inputs the move directions, such as the character of a screen, with a finger. For this reason, there was a problem of applying to presence depending on the content of a game.

[0005] For this reason, the equipment which recognizes the movement of a player is proposed. This equipment has the video camera and the personal computer. And in the software of a personal computer, the pause of a player is recognized from a bodily border line. When the pause of operation was beforehand stored in the personal computer and the player made the same pose as it in it, the character of a screen was what performs operation of moving similarly.

[0006]

[Problem(s) to be Solved by the Invention] However, the method of extracting the border line of the conventional player and recognizing the pause of a player requires time and effort for extraction of the border line of a player. For this reason, there was a problem that become complicated, and equipment was enlarged and composition became expensive [ equipment ].

[0007] Therefore, the purpose of this invention is easy composition and is to offer the position detection equipment of the operator for detecting the movement of the body of a player, and the display controller using this.

[0008] Other purposes of this invention are to offer the position detection equipment of the operator for detecting the movement of the body of a player, and the display controller using this by small composition.

[0009] Another purpose of this invention is to offer the position detection equipment of the operator for detecting the movement of the body of a player, and the display controller using this by cheap composition.

[0010]

[Means for Solving the Problem] For achievement of this purpose, the claim 1 of this invention In the position detection equipment of the operator who detects an operator's position in order to control the content of a display according to a detection position An infrared luminescence means to emit light in

infrared radiation, and an infrared reflective means for it to be prepared for the aforementioned operator and to reflect the infrared radiation from the aforementioned infrared luminescence means, It is characterized by having a position detection means to detect the position of the aforementioned infrared reflective means from the output of a 2-dimensional image pck-up means to picturize the infrared radiation by which reflection was carried out [ aforementioned ], and the aforementioned 2-dimensional image pck-up means.

[0011] Moreover, in order that the claim 2 of this invention may control the content of a display according to a detection position, it is prepared for the aforementioned operator and carries out having a position detection means detect the position of the aforementioned infrared luminescence means as the feature in the position detection equipment of the operator who detects an operator's position from the output of an infrared luminescence means emit light in infrared radiation, a 2-dimensional image pck-up means picturize the infrared radiation by which luminescence was carried out [ aforementioned ], and the aforementioned 2-dimensional image pck-up means.

[0012] In the display controller for the claim 3 of this invention detecting an operator's position, and controlling the content of a display according to a detection position An infrared luminescence means to emit light in infrared radiation, and an infrared reflective means for it to be prepared for the aforementioned operator and to reflect the infrared radiation from the aforementioned infrared luminescence means, It is characterized by having a position detection means to detect the position of the aforementioned infrared reflective means, and the control means for controlling the content of a display according to the detection position of the aforementioned position detection means from the output of a 2-dimensional image pck-up means to picturize the infrared radiation by which reflection was carried out [ aforementioned ], and the aforementioned 2-dimensional image pck-up means.

[0013] In the display controller for the claim 4 of this invention detecting an operator's position, and controlling the content of a display according to a detection position An infrared luminescence means to be prepared for the aforementioned operator and to emit light in infrared radiation, and a 2-dimensional image pck-up means to picturize the infrared radiation by which luminescence was carried out [ aforementioned ], It is characterized by having a position detection means to detect the position of the aforementioned infrared luminescence means, and the control means for controlling the content of a display according to the detection position of the aforementioned position detection means from the output of the aforementioned 2-dimensional image pck-up means.

[0014]

[Embodiments of the Invention] The block diagram of a detector [ in / drawing 2 / in the block diagram of a digital disposal circuit / in / drawing 2 / drawing 2 / the 1st example explanatory drawing of this invention and / drawing 1 / the 1st example block diagram of this invention and drawing 3 , and / in drawing 4 ] and drawing 5 ] and drawing 6 are the 1st example screen processing flow view of this invention. / the 1st example mounting view of this invention

[0015] As shown in drawing 1 , TV-game equipment 1 is carried on television 4. This TV-game equipment 1 has the display-output line 2 and the voice output line 3. Both [ these ] the output lines 2 and 3 are connected to television 4. TV-game equipment 1 emits light in infrared radiation in the front face of equipment, and receives the infrared light reflected from the front face of equipment so that it may mention later.

[0016] On the other hand, a player 6 is played, being located in front of television 4 and looking at Screen 40 of television 4. the wrist of a player 6 -- infrared reflection -- members 50 and 51 are formed moreover -- the ankle of a player 6 -- infrared reflection -- members 52 and 53 are formed infrared reflection -- members 50-53 consist of metallic foils, such as aluminum

[0017] As shown in drawing 2 , the infrared light emitting device 8 consists of infrared light emitting diodes etc. The infrared light emitting device 8 irradiates infrared radiation in the front face of TV-game equipment 1. A switching circuit 9 is for carrying out ON/OFF control of the infrared light emitting device 9 at the origin of the control of the main processor 10 mentioned later.

[0018] The main processor 10 performs the main control of a TV game. A system bus 11 is for connecting the main processor 10, and ROM12, RAM13, VDP14, FMSG17 and I/O Port 24 which are

mentioned later.

[0019] ROM12 stores a game program etc. ROM12 consists of a well-known ROM cartridge, a CD-ROM, etc. RAM13 is used as work memory of the main processor 10.

[0020] The video processor (VDP) 14 changes the image data of the game program of ROM12 into a picture signal according to directions of the main processor 10. Video RAM 15 is used for picture signal creation processing of the video processor 14.

[0021] An encoder 16 changes the picture signal from the video processor 14 into a video signal. The Frequency Modulation sound circuit 17 generates a sound signal with the directions from the main processor 10.

[0022] In addition, from the main processor 10 to Frequency Modulation sound 17 constitutes a display-control means.

[0023] The infrared filter is prepared in the lens 18. And a lens 18 is formed before the 2-dimensional image pickup device 19. The 2-dimensional image pickup device 19 consists of CCD (Charge Coupled Device). The 2-dimensional image pickup device 19 changes into a video signal the 2-dimensional picture inputted by the lens 18.

[0024] A driver 20 drives the 2-dimensional image pickup device 19 according to the clock from the source 21 of a clock. The source 21 of a clock supplies a drive clock to a driver 20, a digital disposal circuit 22, and a detector 23.

[0025] The digital disposal circuit 22 consists of signal arrangement processors (Signal Disposal Processor). The composition of this digital disposal circuit 22 is later mentioned by drawing 4. A detector 23 is for the output of a digital disposal circuit 22 detecting the position of 2-dimensional one. The composition of a detector 23 is later mentioned by drawing 5. I/O Port 24 connects a system bus 11, a switching circuit 9, and a detector 23.

[0026] The video outlet terminal 25 is a terminal which outputs the video signal of an encoder 16. The video outlet terminal 25 is connected to the display-output line 2. The voice output terminal 26 is a terminal which outputs the sound signal of the Frequency Modulation sound circuit 17. The voice output terminal 26 is connected to the voice output line 3.

[0027] Next, the mounting composition of this TV-game equipment 1 is explained. As shown in drawing 3, the main printed circuit board 34 is carried in the lower cabinet 32. Each circuit other than lens 18 or 2-dimensional image-pickup-device 19 and infrared light-emitting-device 8 is carried in this main printed circuit board 34.

[0028] On the other hand, the upper cabinet 30 has the front section 31. The sub printed circuit board 33 is attached in this front section 31. The 18 or 2-dimensional lens image pickup device 19 and the infrared light emitting device 8 are carried in the sub printed circuit board 33. The sub printed circuit board 33 and the main printed circuit board 34 are connected by the cable connector 35.

[0029] And the upper cabinet 31 is inserted in the lower cabinet 32. Thereby, the TV-game equipment shown in drawing 1 is completed.

[0030] Drawing 4 explains the composition of a digital disposal circuit shown in drawing 2. The digital disposal circuit 22 consists of TCK-255A CCD boards made from for example, Texas Instrument. As shown in drawing 4, a sample hold circuit 40 does the sample/hold of the video signal from the 2-dimensional image pickup device 19. The AGC amplifier 41 controls the gain of the output of a sample hold circuit 40 automatically.

[0031] The gamma correction amplifier 42 carries out the gamma correction of the output of the AGC amplifier 41, and outputs it to the aperture amplifier 43. A driver 44 drives the output of the aperture amplifier 43, and outputs it to a detector 23.

[0032] Next, drawing 5 explains the composition of a detector shown in drawing 2. X position counter 45 shows the position of the direction of X on a screen. X position counter 45 is reset by the horizontal synchronizing signal Hsync, and carries out counting of the drive clock. Y position counter 46 shows the position of the direction of Y on a screen. Y position counter 46 is reset by the vertical synchronizing signal Vsync, and carries out counting of the horizontal synchronizing signal Hsync.

[0033] The position detector 47 has the latch circuit which latches X position of X position counter 45,

and Y position of Y position counter 46 by the output of the binary-ized circuit which makes binary the video signal from a digital disposal circuit 22, and a binary-ized circuit. The content of this latch circuit is outputted as a position detecting signal.

[0034] Next, drawing 6 explains operation of the example of drawing 1 and drawing 2. Drawing 6 shows the game of the penalty kick of the soccer shown in drawing 1. And the goalkeeper of a screen is operated according to the movement of a player.

[0035] (S1) By the depression of the start key which is not illustrated, the main processor 10 is directed to the video processor 14 so that a background and the character A (goalkeeper) may be displayed. Thereby, a background and the character A (goalkeeper) are displayed on Screen 40 of television 4.

[0036] (S2) Through I/O Port 24, the main processor 10 reads the output of a detector 23, and detects the position of the character A(player) 6. Here, the infrared light emitting device 8 is always irradiating infrared radiation in the front face of television 4. And the 2-dimensional image pickup device 19 is picturizing the infrared image of the front face of television 4. for this reason, infrared reflection of the player 6 which showed the detector 23 to drawing 1 -- the position of members 50-53 is outputted

[0037] The main processor 10 holds this detection position to RAM13.

[0038] (S3) Next, the main processor 10 is directed to the video processor 14 so that the scene where the character B (kicker) kicks a ball may be displayed. Thereby, the scene where the character B (kicker) kicks a ball is displayed on Screen 40 of television 4.

[0039] (S4) According to this display screen, as shown in drawing 1, a player 6 carries out movement which catches a ball. Again, through I/O Port 24, the main processor 10 reads the output of a detector 23, and detects the position of the character A(player) 6.

[0040] And the main processor 10 computes movement magnitude from the position detected at Step S2, and the position detected by step S4.

[0041] (S5) According to movement magnitude, the main processor 10 chooses the character A and directs a display position to the video processor 14. It is displayed on the position where the pattern of the selected character A was specified by this to be Screen 40 of television 4.

[0042] For example, in the example of drawing 1, the character A prolonged aslant is chosen as the character A. And the character A is displayed on the position corresponding to movement magnitude.

[0043] (S6) The main processor 10 judges whether the character A and the ball contacted with a detection position by step S4. If it judges with the main processor 10 not contacting, the main processor 10 directs a gall display to the video processor 14. Thereby, a gall display is made in Screen 40 of television 4.

[0044] (S7) If it judges with the main processor 10 having contacted, NO gall display is directed to the video processor 14. Thereby, NO gall is displayed on Screen 40 of television 4. And the main processor 10 directs a score display to the video processor 14. Thereby, a score is displayed on Screen 40 of television 4.

[0045] (S8) The main processor 10 detects whether game end keys, such as a reset key which is not illustrated, were pushed. The main processor 10 returns to the oak and Step S2 whose game is not an end. On the other hand, if it is a game end, it ends.

[0046] Thus, since the movement of the body of a player is detected and the display position of the character (stripe) is controlled according to a detection position, the play of the game which exists a feeling of presence is attained.

[0047] Moreover, since infrared radiation is used, distinction with the light can be performed and the movement of a player (target) can be detected appropriately. Since it constitutes using an infrared light emitting device, its reflective member, and a 2-dimensional image pck-up element, the movement of a player is detectable with simple composition.

[0048] Furthermore, since it can constitute from a video camera of monochrome, a 2-dimensional image pck-up element is cheaply realizable. And since it can unite with a cabinet, it is realizable small.

[0049] According to the content of a game, the various positions of a player 6 can be equipped with this infrared reflective member that what is necessary is just to equip the required part of a player 6. Moreover, the number of wearing parts one and they can be chosen according to the content of a game.



[0050] Drawing 7 is the 2nd example explanatory drawing of this invention, and drawing 8 is the 2nd example image-processing flow view of this invention.

[0051] In drawing 7, the same sign has shown the same thing as what was shown by drawing 1 and drawing 2. Drawing 7 shows the marathon game. the ankle of a player 6 -- infrared reflection -- it is equipped with members 54 and 55 And the scroll rate of the background of Screen 40 is controlled by movement of the leg of a player 6 in this game.

[0052] In drawing 7, TV-game equipment 1 is the same as that of the thing of composition of that drawing 1 and drawing 2 showed. And TV-game equipment 1 is connected to television 4 by output lines 2 and 3.

[0053] Drawing 8 explains processing operation.

[0054] (S10) By the depression of the start key which is not illustrated, the main processor 10 is directed to the video processor 14 so that a background and the character (runner) may be displayed. Thereby, a background and the character (runner) are displayed on Screen 40 of television 4.

[0055] (S11) Through I/O Port 24, the main processor 10 reads the output of a detector 23, and detects the current position of a player 6. Here, the infrared light emitting device 8 is always irradiating infrared radiation in the front face of television 4. And the 2-dimensional image pickup device 19 is picturizing the infrared image of the front face of television 4. for this reason, infrared reflection of the player 6 which showed the detector 23 to drawing 7 -- the position of members 54-55 is outputted

[0056] The main processor 10 holds this detection position to RAM13.

[0057] (S12) Next, again, through I/O Port 24, the main processor 10 reads the output of a detector 23, and detects the position of a player 6.

[0058] (S13) And the main processor 10 computes movement magnitude from the position detected at Step S11, and the position detected at Step S12.

[0059] (S13) The main processor 10 directs the scroll rate of a background to the video processor 14 according to movement magnitude. And according to movement magnitude, the main processor 10 is directed to the video processor 14 so that the selection switch of the leg progress of the character may be carried out. Thereby, the character of the switch speed of the directed leg is displayed on Screen 40 of television 4 at the directed background speed.

[0060] (S14) The main processor 10 investigates whether the background reached gall. If the background has not reached gall, it will return to Step S12.

[0061] (S15) Conversely, if the background has reached gall, the main processor 10 directs the display of goal-in to the video processor 14. Thereby, in Screen 40 of television 4, the display of goal-in is made and it ends.

[0062] Thus, according to the detection position result by infrared radiation, you may control a background as a stripe.

[0063] Drawing 9 is the 3rd example explanatory drawing of this invention, and drawing 10 is the 3rd example block diagram of this invention.

[0064] In drawing 9, the same sign has shown the same thing as what was shown by drawing 1 and drawing 7. Drawing 9 shows the painting game. The player 6 has the luminescence pen 7. The luminescence pen 7 prepares and constitutes infrared light emitting diode on a pen. And in this game, the tracing is displayed on Screen 40 by the movement of the luminescence pen 7 of a player 6.

[0065] In drawing 9, TV-game equipment 1-1 deletes the infrared light emitting device 8 and a switching circuit 9 from the thing of the composition of drawing 2, as shown in drawing 10. In addition, in drawing 10, the same sign has shown the same thing as what was explained by drawing 2. This TV-game equipment 1 is connected to television 4 by output lines 2 and 3.

[0066] That is, this example gives a luminescence pen to a player 6, and deletes the infrared light emitting device 8 and a switching circuit 9 from TV-game equipment. When the 1st example is a reflective type, this 3rd example is a light-receiving type thing.

[0067] And according to the movement of the luminescence pen 7 of a player 6, the content of a display of Screen 40 of television 4 is controlled.

[0068] In this example, the 2-dimensional image pickup device 19 is picturizing the infrared image of

the front face of television 4. For this reason, a detector 23 outputs the position of the infrared luminescence pen 7 of a player 6.

[0069] even if it carries out, in order [ thus, ] to detect the movement of the body of a player and to control the display position of the character (stripe) according to a detection position -- a feeling of presence -- the play of a certain game is attained

[0070] Moreover, since infrared radiation is used, distinction with the light can be performed and the movement of a player (target) can be detected appropriately. Since it constitutes using an infrared light emitting device and a 2-dimensional image pck-up element, the movement of a player is detectable with simple composition.

[0071] Furthermore, since it can constitute from a video camera of monochrome, a 2-dimensional image pck-up element is cheaply realizable. And since it can unite with a cabinet, it is realizable small.

[0072] In this invention, the next deformation other than an above-mentioned example is possible.

[0073] \*\* Although the example which carried both the position detection mechanism and the game controlling mechanism in a cabinet 30 and 32 explained, only the position detection mechanisms 8, 9, 18-23 can be carried in a cabinet, and it can also connect with commercial game equipment.

[0074] \*\* CRT, a liquid crystal display element, etc. can be used as television.

[0075] As mentioned above, although the example explained this invention, deformation various by within the limits of the main point of this invention is possible, and these are not eliminated from the range of this invention.

[0076]

[Effect of the Invention] According to this invention, the following effect is done so as explained above.

[0077] \*\* Since a 2-dimensional image pck-up element detects the reflected light or luminescence light of an infrared light emitting device prepared in the player, the movement of a player can be detected and the display control according to the movement becomes possible.

[0078] \*\* The movement of a player is detectable with simple composition again.

[0079] \*\* It is cheaply [ that it is still smaller and ] realizable.

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[Translation done.]